



Software
Technical
Reference
Guide

SpeedStor[®]

Hard Drive Installation, Management and Diagnostic Software for DOS

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Hard Drive Installation, Management and Diagnostic Software for DOS

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This manual is for technically experienced users only. If you are not comfortable making technical decisions about integrating hard drives into your system, do not continue reading.

See the *Quick Installation Reference Card* for information about INSTALL, the automatic installation program that is provided with SpeedStor®. With INSTALL, you will be referred to this manual only as necessary, to help you obtain information for the automatic installation program.

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About This Manual

This manual provides instructions for installing and using SpeedStor® disk management software, SSTOR, the SpeedStor manual installation process.

Before using SpeedStor software, you must have installed your hard drive according to the manufacturer's instructions. You should also be familiar with the manuals that were included with your computer system, specifically, your computer's operating guide and Disk Operating System(DOS) manuals.

This manual is organized as follows:

Chapter 1: Introduction lists system requirements, and provides an overview of SpeedStor's features.

Chapter 2: Customizing your Installation shows experienced users how to use SpeedStor's advanced features to customize the installation of a hard drive.

Chapter 3: Using Advanced SpeedStor Features provides information for experienced users who want to use SpeedStor's advanced features to customize a drive's partitions.

Chapter 4: Using SpeedStor Diagnostics describes SpeedStor's diagnostic capabilities for analyzing and troubleshooting problems with a hard drive.

Chapter 5: Using ParkHeads shows you how to use SpeedStor's ParkHeads option to part your drive's heads for safety when moving your drive.

Chapter 6: Using Command- and Device-Line Options explains how to use SpeedStor's command-line options and device-line options with SSTOR.SYS, the device driver.

Appendix A: SpeedStor Files identifies the files that reside on the SpeedStor diskette and explains their functions.

Appendix B: Controllers discusses controllers supported by SpeedStor and explains how SpeedStor can be used with unsupported controllers.

Appendix C: Special Configurations provides information on using SpeedStor with non-standard hardware or software configurations. This appendix contains information on setting up mixed-drive systems and on using SpeedStor with multiple operating systems and Windows 3.0.

Chapter 1 Introduction

Use this manual and your SpeedStor® software package to integrate one or more hard drives into your system.

SSTOR, SpeedStor's manual setup program, gives you access to advanced drive integration and testing features. This manual explains how to customize your drive's installation using the Manual Setup, Partition Manager, and Diagnostics features.

SpeedStor software also includes a number of command-line options and provides option defaults suitable for most system configurations. If you have special configurations, refer to Chapter 6 for more information on SpeedStor's command-line options.

Compatibility

Most standard application programs such as word processors, database managers, compilers, and spreadsheet programs are compatible with SpeedStor. Application software that uses standard methods prescribed by DOS work with SpeedStor and large volumes or high-capacity disk drives.

Some applications, however, make erroneous assumptions about the disk and will not work properly. Programs in this category are typically disk utilities that bypass DOS to speed their application or that add functions not supported by DOS. Microsoft Corporation has identified two scenarios where compatibility problems could arise when using Windows 3.0 with disk partitioning software. See Appendix C, Special Configurations, for more information on this.

System Requirements

To use SpeedStor, you need

- an ISA or EISA computer
- a controller or host adapter
- interface and power cables
- a drive or drives compatible with the controller
- PC- or MS-DOS version 2.0 or higher
- at least one 3 1/2" or 5 1/4" floppy drive
- a minimum of 384K Random Access Memory (RAM)

Using SpeedStor Menus

At the top of the screen, below the copyright message and the screen title, is the current selection of available options. One of these functions will always be highlighted by the cursor bar. In Figure 1, the option ManualSetup is highlighted.

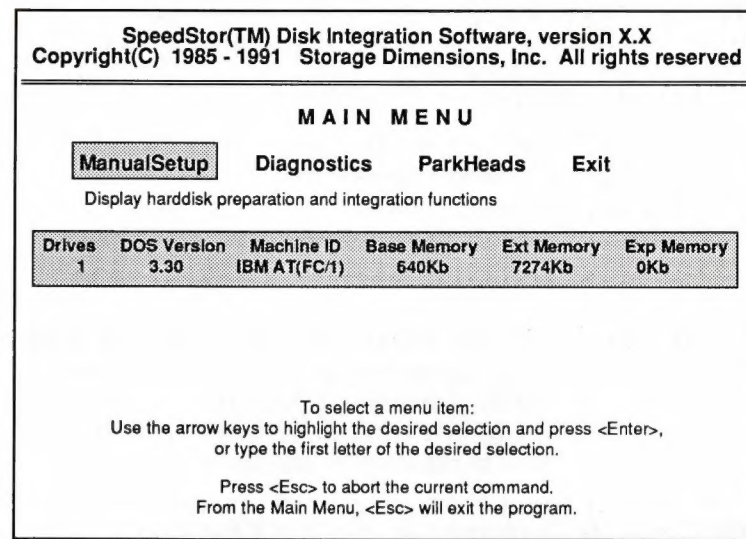


Figure 1: SpeedStor's Main Menu

The drive-status bar appears below the menu options. Different options appear in this bar depending on which SpeedStor menu you are using.

Drives	Indicates the number of drives SpeedStor identifies in the system.
DOS Version	Indicates the version number reported by DOS.
Machine ID	The type of computer indicated by the ROM BIOS. SpeedStor displays two numbers within parentheses. The first number is the model byte while the second is the sub-model byte as reported by the BIOS.
Base Memory	Indicates the amount of RAM with physical addresses less than or equal to one megabyte.
Ext Memory	Indicates the total extended memory in the system. Extended memory is memory at physical addresses above one megabyte that an 80286 or 80386 system can access in protected mode.
Exp Memory	Indicates the total amount of expanded memory in the system. Expanded memory is the LIM EMS (Lotus, Intel, and Microsoft) designation for memory beyond the 640K.

The information in the drive status bar in the Manual Setup menu and the Partition Manager menu (one path under the Manual Setup menu) is explained in the corresponding chapters of this guide. The section below the drive status bar displays additional information appropriate to the current menu. For example, when you are using the Partition Manager, this part of the screen displays the partition table; when you are using Manual Setup, it displays a defect table.

Chapter 2 Customizing Your Installation

SpeedStor software includes many features for advanced users who want to perform specific tasks in preparing a hard disk. Many of these features are available on the Manual Setup Menu.

Use ManualSetup to perform the following advanced low-level procedures:

- Enter drive defects
- Initialize the drive
- Select drive type from internal disk drive type table
- Lock out bad tracks without reinitializing drive
- Use different interleaves on different areas of a hard disk
- Change interleave without destroying data.

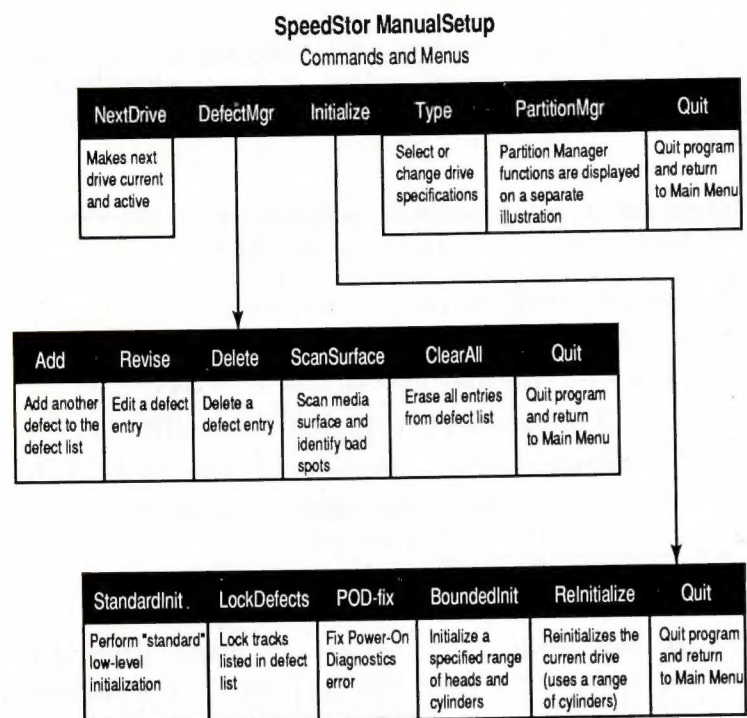
Before You Begin

The installation process is divided into two phases: physically installing the drive and integrating the drive into your system. Before you invoke SSTOR, your drive should already be installed your drive, following the manufacturer's instructions.

Before beginning the actual SpeedStor installation, you should:

- write protect your original SpeedStor diskette
- make a backup copy to use during the installation
- store your original SpeedStor diskette in a safe place.

You should also take a few moments to familiarize yourself with the program structure illustrated in the following menu diagram for Manual Setup.



Invoking SSTOR

From the SpeedStor Main Menu, highlight Manual Setup and press <Enter>. The Manual Setup Menu appears. The status bar displays the following information:

Drive	The number of the active drive. Use NextDrive to select another drive.
Manufacturer/Model	The manufacturer and model of your hard drive. Use the Type option to change the manufacturer and model.
Cyls	The total number of cylinders on the active drive as determined by the selected manufacturer and model.
Heads	The total number of heads on the active drive as determined by the selected manufacturer and model.
Secs	The number of sectors per track on the active drive as determined by the selected manufacturer and model.
Precomp	The number of the cylinder at which write-precompensation takes effect.
Lzone	Landing zone—the cylinder number where the heads are parked.
Total Bytes	The total number of bytes on the active drive.

Using ManualSetup Options

The following sections describe the ManualSetup menu options.

NextDrive

You can select NextDrive only when two or more hard drives are installed with your system. To indicate which drive is active, select NextDrive until the drive you want to make active appears under Drive in the status bar.

Defect Manager

Defective tracks are damaged tracks on the hard disk where data cannot be written. A bad track table is a table of defective tracks that will be locked out from use.

Defect Manager creates or edits a table of bad tracks to be locked out, either by entering defect locations from a manufacturer's defect list onto a bad track table, or scanning the disk surfaces to determine locations of currently locked out tracks.

SCSI and IDE controllers, and some other controllers as well, do not support or need defect tables or maps. If you are using such a controller, the DefectMgr option will not be selectable.

Create or edit the defect table for your hard disk from the ManualSetup menu by selecting DefectMgr. The following options appear:

Add Prompts you to enter the head number, then the cylinder number of each bad track.

Revise Modifies an entry in the bad track table. Use the cursor arrow keys to highlight the entry you want to revise and press <Enter>.

Delete Deletes an entry in the bad track table. Use the cursor arrow keys to highlight which entry you want to delete and press <Enter>.

ScanSurface Scans a hard drive to verify the initialization and report the tracks that have been previously locked out. (This will not catch "marginally" bad spots on the drive.) You can scan the entire surface of the drive (default), or specify a range of cylinders and a range of heads to be scanned. Use the SpeedStor utility, Media Analysis (Chapter 4) to detect marginal defects.

ClearAll Deletes all entries on the bad track table.

Quit Returns to the Manual Setup Menu.

Refer to the bad-track or media-defect list supplied with your hard drive. If there are media defects listed, select Add. If there are no bad tracks listed on the defect list, select Quit and proceed to the next section.

Note: Failure to enter media defect locations could result in poor disk performance or loss of data.

SpeedStor prompts for the head number and cylinder number of the bad track. Repeat this step for all bad tracks.

If you make an error while entering bad tracks, select Revise, Delete, or ClearAll to edit the bad track table again.

After you have entered all defect locations for all of the drives you are installing, select **Quit**.

Initialize

Initializing a drive provides a foundation for storing data. If your hard disk has not been initialized previously (by the manufacturer or a dealer) it will need to be initialized when you install it. Note that all data will be permanently erased during initialization.

Initialize your hard disk by selecting **Initialize** and pressing <Enter>. The Initialization menu appears displaying the following options:

StandardInit

StandardInit performs all the steps required for low-level initialization including the following functions:

- Build defect table
- Get interleave from the user
- Perform low-level initialization
- Scan for more bad tracks (tracks that are not in the defect list, but that still failed to be initialized)
- Lock out bad tracks
- Perform POD-fix if needed (Power-On Diagnostics)

LockDefects

This option locks out tracks that you entered into the bad track table. *Any data that is present on a track will be lost when you lock out the track.* Use this option after running one of the diagnostic options, such as **MediaAnalysis** (see Chapter 4),

which locates media defects that are not on the defect list supplied with the hard disk.

After locking out additional tracks, use SpeedStor's Partition Manager to reformat the partitions with newly locked tracks.

Note: Locking out bad tracks does not mark areas that are bad in the File Allocation Table (FAT), but keeps track of the defect location and insures that the track is not used in the future.

POD-Fix

POD-Fix locks out a specific track as if it contained a media defect. Under rare circumstances, the Power On Diagnostic (POD) will display a 17XX error. When this happens, press <F1> to continue, reboot (if necessary), and then invoke SpeedStor by entering **SSTOR** at the DOS prompt

Once you are in SpeedStor, select **ManualSetup**, **Initialize**, then **POD-Fix** to resolve the Power On Diagnostic error message.

POD-Fix should be used only when first installing a hard disk. This is automatically done with the **StandardInit** option.

BoundedInit

The **BoundedInit** option performs a low-level initialization on a specified range of heads and cylinders. You can also use **BoundedInit** to format different interleave values on specified partitions, achieving optimum data throughput under many circumstances.

Select **BoundedInit** and specify the cylinder and head ranges.

After initialization is complete, use Partition Manager to create and format the partition(s).

Note: Some disk controllers do not allow for a regional initialization. When this is the case, you will not be able to select the BoundedInit menu.

Reinitialize

Use Reinitialize to change the interleave of your hard disk or to change the interleave in a specified range of cylinders, without losing the data. SpeedStor saves data to a memory buffer before formatting the cylinders.

Note: You should still make a backup copy of the data before beginning the Reinitialize routine, as a safety precaution.

After initialization, the buffer restores the previous contents of the cylinders. If the entire track cannot be read, then that track is not reinitialized.

To use this option, select Reinitialize from the Initialization menu, then select the default cylinder and head ranges to reinitialize the entire hard disk, or manually select a range of cylinders for a partition.

Select a new interleave or accept the default.

Note: Some disk controllers do not allow regional initialization. In this case, you will not be able to select Reinitialize.

If you use Reinitialize on a non-IBM standard controller that uses a sector translation mode, you might destroy your data. Consult your controller manufacturer for more information.

Type

For an AT-style computer, do not run the host computer "setup" program to change disk drive types when using SpeedStor. Allow SpeedStor to specify the drive type. If you use the host computer setup program, you need to reselect the drive type using SpeedStor's ManualSetup feature.

Type Options

Specify the hard drive, type by selecting the number of the drive you want to type and pressing <Enter>. (Drive two is not displayed unless a type for drive one has been specified.)

SpeedStor displays a list of drive options. Select the option you want. SpeedStor displays a list of types of drives produced by the selected manufacturer. Select the desired drive type.

You do not need to select a drive type for a SCSI drive.

Additional Type Options

Some items on the manufacturer's list may provide you with an alternative way of designating the drive type. These are listed and described below.

<no drive>

Sets the drive type so that the system will no longer recognize the drive.

- <Standard Type> Selects a drive type from the AT system ROM drive type table. Be certain that the selection from the <Standard Type> menu represents the identical parameters (number of read/write heads, cylinders, etc.) as the hard drive being installed.
- <Manual Params> Specify the characteristics of the hard drive manually.

Using Manual Params

From the Type menu, select a hard drive type from the <Standard Type> options (above). The drive type selected from the Standard Type table should have the same number or fewer heads as the hard drive being installed. It should have the same number or fewer cylinders as the hard drive being installed.

After a Standard Type is selected, the Drive Status bar displays the selected drive characteristics. SpeedStor returns to the Main Menu. Re-enter the Type menu and select <Manual Params>. A table with the characteristics of the drive type selected appears. You can change the characteristics to correspond to the hard drive being installed.

Using the AT Setup Set Configuration Programs

AT-style computers store system configuration information in an area of battery-backed-up CMOS RAM. This information is normally changed with the system Setup program (found on the Diagnostics diskette of AT-style systems).

With many hard drive types, SpeedStor overrides the information stored by these programs so that non-standard drive types (not included on the system ROM BIOS look-up table) can be installed in the computer. Information that SpeedStor placed in CMOS could be lost when you use the system's Setup or Set Configuration program.

To safeguard against this, invoke SpeedStor with the /NOCMOS option and then reselect the drive Type from SpeedStor after using Setup. (Refer to Chapter 6 for information on how to use /NOCMOS in a command-line entry.)

Note: After running the Setup program, you need to select the drive type again, using SpeedStor's Manual Setup.

Partition Manager

Partition Manager Features are described in the next chapter.

Quit

Select Quit to return to SpeedStor's Main Menu.

Chapter 3

Using Advanced SpeedStor Features

With Partition Manager you can create and format up to twenty-four partitions on your hard drive(s). Use it in place of the DOS utility programs, FDISK and FORMAT. With SpeedStor's Partition Manager, you can:

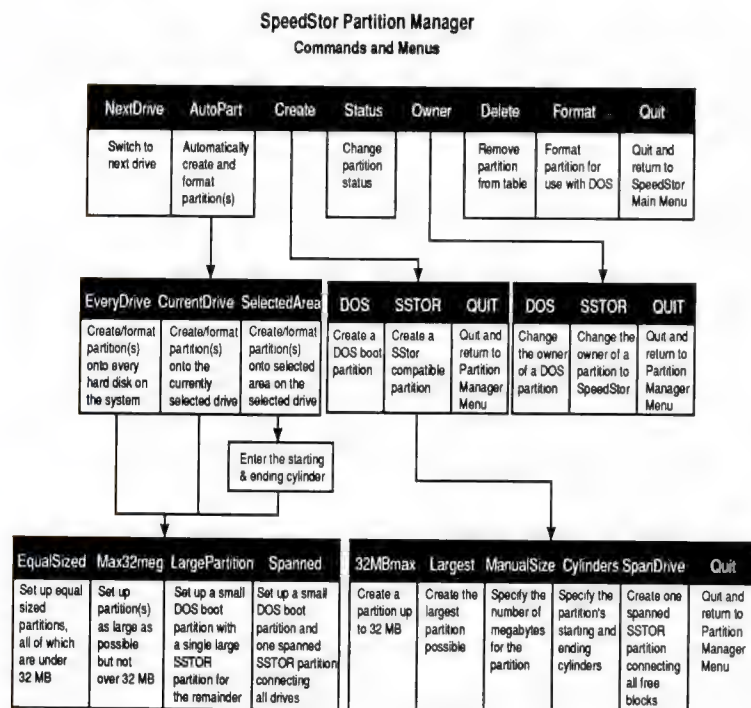
- Create and format up to twenty-four DOS-compatible partitions on a single drive.
- Create partitions (volumes) as large as drive capacity (in most cases).
- Create read-only partitions to protect valuable data and programs from accidental erasure or illegal access.
- Specify which partition will be booted from when using multiple operating systems.
- View the Partition Table.

Partition Manager encompasses the features of both DOS's partition editor, FDISK, and DOS's utility, FORMAT.

Note: You may lose data if you use FORMAT or FDISK after using SpeedStor.

Partition Manager Menu Diagram

The following diagram illustrates SpeedStor's Partition Manager Menu options:



Invoke Partition Manager Menu by selecting PartitionMgr from ManualSetup.

The Drive Status Bar

The Partition Manager Menu drive status bar is directly below the menu option description and displays the following information:

- Drive** The number of the current drive. Use NextDrive to make another drive current.
- Manufacturer/Model** The manufacturer and model of your hard drive.
- Cyls** The total number of usable cylinders on the active drive. (This number is usually different than the number of cylinders displayed on the Manual Setup menu; a cylinder might be reserved for diagnostics purposes.)
- Heads** The total number of usable heads on the active drive. The number of usable heads may appear as *xx/yy*, where *xx* refers to the boot parameter used by DOS-owned partitions on that drive, and *yy* is the real drive parameter used by SSTOR-owned partitions on that drive.
- Sectors** The number of sectors on the active drive. The number of usable sectors may appear as *xx/yy*, where *xx* refers to the boot parameter used by DOS-owned partitions on that drive, and *yy* is the real drive parameter used by SSTOR-owned partitions on that drive.

Total Bytes	The total number of usable bytes on the current drive.
Free Bytes	The amount of unused space available on the current drive for partitioning.

The Partition Table

The Partition Table appears below the drive status bar on the Partition Manager Menu. Once you have selected an option, you can highlight specific partitions. The following information about each partition is displayed:

No.	The number of the partition.
Owner	The device driver or operating system supporting the partition. If SpeedStor cannot recognize the operating system, the system ID appears enclosed in parentheses. Refer to the section describing the Owner option for more information.
DOS Compatibility	Displays the range of DOS version(s) that you can use with the partition. You cannot create a partition that is incompatible with the current DOS version. You can invoke Format, Delete, and Status functions on incompatible partitions. Provides extra information about the partition. Extended partitions all have logical sector sizes greater than 512 bytes.

Status	Displays the status of the partition: boot (active), usable, read/write, read-only, and ignored. Refer to the "Status" section of this chapter for information on partition status.
Cylinder Start/End	Displays the numbers of the cylinders where the partition starts and ends.
Sectors	Displays the number of physical sectors the partition occupies.
Bytes	Displays the number of bytes the partition occupies.

The following sections describe how to use the options displayed on SpeedStor's Partition Manager Menu.

NextDrive

You can select NextDrive only when two or more hard drives are installed in your system. Use NextDrive to switch between drives. SpeedStor options act on the drive that is highlighted on the menu bar under this selection.

AutoPart

Use SpeedStor's AutoPart option to create and format partitions for an entire hard disk, for all hard disks in a system, or for a selected area of a disk. (AutoPart automates the Partition Manager's Create and Format menus.)

The advantages to using AutoPart instead of Create and Format include the fact that AutoPart creates and formats multiple partitions with a single command, and automatically avoids defective areas of the disk when the defects would have been in critical areas of a partition.

You cannot select AutoPart when all the disk space has already been allocated, or when there are already 24 DOS or SSTOR partitions.

Invoke AutoPart by selecting AutoPart from the ManualSetup menu. The following options are available:

- EveryDrive Partitions all available space on all drives.
- CurrentDrive Formats all available space on the currently-active drive. If you have more than one hard disk in your system, use NextDrive to specify which drive is active before using AutoPart's CurrentDrive.
- SelectedArea Indicate the starting and ending cylinder number for the partition(s) on the active drive.
- Select the drive or range of cylinders you want to partition, using one of the following options.
- EqualSized Creates equal-sized partitions; partitions will be as large as possible, but no larger than 32 MB.
- Max32meg Creates partitions of 32 MB in size; final partition will be 32 MB or smaller.
- LargePartition Creates one small DOS owned partition on drive one and one large partition for the remainder of the hard disk. The small DOS owned partition size defaults to three MB. (You can change the default using the /BOOTMEGS:xx command-line option.)

SpeedStor creates the DOS partition only if there is no other partition suitable for booting DOS. The maximum size of the large partition depends upon the DOS version (your menu will display what is available). If there is any space remaining after SpeedStor creates the largest partition, an additional partition will be created to fill the remaining space.

- Quit Returns to SpeedStor's Partition Manager menu.

Create

The Create option creates up to twenty-four partitions per hard disk that are usable with DOS. (There cannot be more than twenty-four total DOS- and SSTOR-owned partitions within the system.)

If there is no free space available to create a partition, or if twenty-four partitions already exist, you will not be able to select the Create option. After a partition is created, you must format it using the Partition Manager's Format option.

You need to determine whether to create DOS or SSTOR partition(s). Be aware of the characteristics in the table below when deciding this.

Partition Characteristics	
DOS	SSTOR
<ul style="list-style-type: none"> One partition can be bootable. (SpeedStor will move a partition to the first place on a drive if it is marked "boot.") 	<ul style="list-style-type: none"> SSTOR partitions cannot be bootable.
<ul style="list-style-type: none"> DOS partitions must be 32 MB or smaller when using DOS versions prior to 3.30. 	<ul style="list-style-type: none"> SSTOR partitions can be larger than 32 MB with any DOS version.
<ul style="list-style-type: none"> DOS partitions use head and sector boot parameters which may waste disk space. 	<ul style="list-style-type: none"> SSTOR partitions use true drive head and sector parameters, without wasting disk space.
<ul style="list-style-type: none"> You can create multiple DOS partitions with DOS versions 3.31 and later. 	<ul style="list-style-type: none"> You can create multiple SSTOR partitions no matter which version of DOS you are using.
<ul style="list-style-type: none"> A DOS partition on one system may be unusable when the drive is moved to another system. 	<ul style="list-style-type: none"> SSTOR partitions created on one system are usable on other compatible systems.

Create displays the following partition options:

32MBmax Similar to AutoPart's Max32meg option, 32MBmax creates a partition up to 32 MB in size depending upon how much space is available on the drive.

Largest

Creates the largest possible partition taking into consideration the following:

- the amount of free space available on the hard drive
- any size restrictions specified by the MaxMegs option (See Chapter 6.)
- the amount of space allowed by the owner of the partition (DOS or SSTOR).

ManualSize

Specify the number of megabytes you want the partition to occupy. SpeedStor creates a partition in the first free block large enough to hold the requested size.

Cylinders

Specify the cylinders (starting and ending) where you want the partition to reside.

SSTOR Partition Considerations

Take these things into consideration before using SSTOR partitions:

- Some programs rely on a standard 512-byte logical sector size and cannot reference either a DOS 2.0- to 3.30-compatible extended partition greater than 32 MB. Programs that make standard DOS calls for disk I/O are fully compatible with SSTOR partitions.
- When using DOS 2.0 - 3.3, SSTOR partitions larger than 32 MB cause the DOS sector buffer's size to increase, thus reducing the amount of RAM available for programs. DOS allocates enough memory for each buffer to hold the largest possible sector. To minimize the RAM amount used by DOS, use a value of eight buffers or less in your CONFIG.SYS file.

DOS File Structure Parameters

When creating an SSTOR partition, you will have the choice of specifying the DOS file system structure.

When you create an SSTOR partition, SpeedStor prompts you to enter file system structure parameters. You can select a set of default parameters, or specify file system structure options.

If you select Defaults, SpeedStor creates an SSTOR partition according to the default parameters and returns to the Partition Manager Menu.

If you select Manual, SpeedStor prompts you to enter the logical sector size. Select a logical-sector size, then enter the number of root directory entries you want.

Enter the number of File Allocation Tables you want on your partition, then select your partition's cluster size. SpeedStor creates an SSTOR partition according to the parameters you selected and returns to the Partition Manager Menu.

Note: If there is only one FAT, the partition must be an SSTOR partition.

If you change the default values, make a note of the changes. It is much easier to recover from certain types of disk errors if you know the DOS file system structure.

Status

The Status option allows various properties of the partition to be set or changed. Non-SSTOR owned partitions can have the boot property set or removed (usable); SSTOR owned partitions can be in any of three modes: read/write, read/only, or ignored.

Select Status from the PartitionManager Menu, then select the desired partition line, or enter the partition line number. Select from the following options:

Boot	Only one boot partition is allowed on any drive. Only non-SSTOR owned partitions can be made boot (active). However, SpeedStor will only allow you to make a DOS partition boot (active) if it is possible to boot from that partition.
Usable	Usable partitions are similar to boot (active) partitions except you cannot boot from them. The supporting operating system (DOS) will recognize the partition by assigning it a drive letter. You can select this status for any non-SSTOR partitions.
Write/Read	You can select this status only for partitions owned by SSTOR. Write/Read partitions are compatible with DOS and have complete write/read access.
ReadOnly	You can select "Read Only" status only on partitions owned by SSTOR. Read Only partitions are write-protected.
Ignored	You can select this status only for partitions owned by SSTOR. The SSTOR device driver ignores partitions with this attribute.
Quit	Returns to SpeedStor's Partition Manager Menu.

Note: The SSTOR device driver does not recognize status changes until the system is rebooted.

Owner

The owner of a partition indicates what operating system or device driver supports that partition. Refer to the section of this chapter titled "Create," for more information about DOS and SSTOR partitions. Use the Partition Manager Menu option, Owner, to change the ownership of a partition.

SpeedStor only allows you to change the ownership of a partition if it is acceptable to do so. Be aware of the following conventions when you want to change the ownership of a partition from SSTOR to DOS.

- The level of DOS compatibility must be compatible with the current DOS version. The current DOS version must lie within the given DOS compatibility of the partition.
- The boot and real geometries must match (indicated by the two numbers separated by a slash xx/yy).
- The following special considerations of the current DOS version must be met:
 - versions < 3.30 - Maximum of one DOS partition. DOS partition must be in first 32 MB.
 - versions ≥ 3.31 - Logical sector size must be 512 bytes.
- Extended partitions can never have their owner changed.

Select Owner from the Partition Manager menu, and select the desired partition. SpeedStor displays the following Owner options:

DOS	DOS-owned partitions are supported by DOS's block device driver. Not all partitions can become DOS owned as explained in the considerations above.
-----	--

SSTOR	Partitions owned by SSTOR are supported by SpeedStor's device driver and are DOS compatible. Refer to the <i>Create</i> section of this chapter for more information on SSTOR partitions.
-------	---

Quit	Returns to the Partition Manager Menu.
------	--

Select the desired partition Owner, then select Quit to return to the PartitionMgr menu.

Delete

The Delete option removes the selected partition (from the active drive). Free space is available after deleting partition(s). You may lose all data in a partition when you delete it.

Format

After you create a partition, it must be formatted for DOS to use. SpeedStor's Format is similar to DOS's FORMAT, though SpeedStor does not support the /S option. The Partition Manager cannot copy system files. The format process takes several minutes.

After the boot partition is formatted, reboot the system and use SYS:x to copy the system files onto the boot partition. The command should look like this:

install sys:x (/options)

where x is the drive number (most often 1) of the drive you want to copy the system files to.

Note: Be sure to use the same options you chose when you invoked SpeedStor. (This is especially important if you used the option /NOTYPE.)

Use the DOS COPY command to copy the COMMAND.COM file onto the boot partition.

Note: We advise against using SYS.COM to copy the system files onto the boot partition. Because SYS.COM doesn't read the file system structure from the disk, it is possible that your data may be destroyed.

Quit

Select Quit to return to the Manual Setup Menu.

Chapter 4 Using SpeedStor Diagnostics

Use SpeedStor's diagnostic features to locate system faults, to isolate problems with the hard disk or its controller, to find undetected media defects, and to test the hard drives.

To properly isolate system faults and determine if there is a problem with the hard disk drive, start at the beginning of this chapter and continue through each section until you find the problem.

Preliminary Troubleshooting

Improper installation causes most hard disk problems. Follow the steps below to perform preliminary troubleshooting.

1. Turn off your computer.
2. Check the orientation of the hard disk and floppy interconnection cables. Be certain that each cable's pin 1 (indicated by a colored stripe, the number "1," or a notched arrow) is aligned with its connector's pin 1 on the hard disk and hard disk controller. Pin 1 on the hard disk is the first pin on the notched side of the connector. Pin 1 on the controller's connector is indicated by the number "1." Some printed circuit boards have a square pad soldered at the base of pin 1.
3. Make sure that all cables are attached securely to their connectors.
4. Be certain that the drive-select jumper on the hard disk is installed on the proper set of jumper pins.
5. When two internal drives are installed, you must remove the terminating resistor from the drive attached to the middle of the large 34-pin control cable. When external and internal

SCSI drives are installed, remove the terminating resistor from the SCSI host adapter.

6. Turn the power back on. If the hard disk drive is working, you will hear a sound from the drive as it starts to spin and gain speed.

Starting SpeedStor Diagnostics

To use SpeedStor's diagnostic options, select Diagnostics and press <Enter>.

Note: Some hard disk problems are related to temperature. After you turn on your system, the hard disk will begin to generate heat; its temperature will stabilize after approximately one hour. If the hard disk performs properly when turned on while cold, you should retest the disk after an hour. If the test then fails, there may be a heat-related problem.

Select one of the options discussed in the following sections.

NextDrive

You can select NextDrive only when two or more hard drives are installed in your system.

Use NextDrive to indicate a drive. SpeedStor options act on the drive that is highlighted on the Main Menu when you invoke them.

Controller

This test checks the hard disk controller's internal buffers and its communication with the host computer system.

Select Controller from the Diagnostics menu. SpeedStor displays the results, PASSED or FAILED, on the bottom of the display screen after a few seconds.

If the test results are FAILED, check that your hard disk controller is installed firmly in its adapter slot on your system board. If it was properly installed and you receive these results, the hard disk controller is probably defective.

SeekTest

SeekTest checks communication between the hard disk controller and the hard disk, as well as the basic mechanical operation of the drive.

If FAILED appears during this test:

Turn off your computer and repeat the steps in the section called "Preliminary Troubleshooting" in this chapter.

If you make any changes to your cables, jumper options, or terminating resistors, rerun the SeekTest. The drive is probably defective if the SeekTest begins, and the drive begins to function, then an error message appears.

Your system will pass SeekTest if the hard disk, controller, interconnection cables, and the drive select jumpers are functioning properly. If your system passes SeekTest and a problem persists, it is a more subtle mechanical and/or electrical problem. Proceed with ReadTest and WriteTest described in the following section.

Note: Some drives have stepper motor actuators and may fail the SeekTest even when they are operating correctly.

ReadTest and WriteTest

ReadTest and WriteTest check the ability of the hard disk to access (seek), store (write), and recover (read) data. These tests read and write tracks throughout the given range randomly. To run these tests, you must have initialized your drive.

WriteTest performs a drive exercise and a comprehensive write/read data test. Before running WriteTest, make sure all data and programs on the hard disk are backed up.

Note: WriteTest destroys all data on the hard disk.

ReadTest performs a drive exercise and a data test without destroying data on the disk drive.

Both tests can be stopped by pressing any key on the keyboard.

You can select all the cylinders, or your own range of cylinders for the test.

Select DefaultCyls to test every cylinder, or ManualCyls to limit the number of cylinders to a specified range. Enter the number of the first cylinder to be tested, or press <Enter> to start with cylinder 0. Then enter the last cylinder you want tested or press <Enter> to end the test with the last cylinder.

The program prompts you to select all the heads or a range of heads for the test.

Select DefaultHeads to test every head, or ManualHeads to limit the test to a smaller range of heads. Enter the first head to be tested, or press <Enter> to start at the first head. Then enter the last head you want tested or simply press <Enter> to test the last head.

Each test specified performs a random seek to a single sector, then tests the sector. Press <Enter> to begin the test.

If several errors are reported immediately on areas known to have no errors, then there is something wrong. Press any key to stop the test.

As the test runs, errors are reported by head and cylinder numbers on the display screen's Defect Table. Compare the defect list originally supplied with the hard disk and the list of errors displayed on the Manual Setup Defect Table. The manufacturer's defect list was compiled using a high performance analog disk controller. It is not possible for the controller in your system to locate all the different types of defects that the manufacturer can find.

It is normal for SpeedStor to locate far fewer defects than there are in the manufacturer's defect list. Do not assume that the tracks on the manufacturer's list that are not found under SpeedStor are usable. On the contrary, they are the tracks most likely to fail. Be sure to lock out all the defects in the manufacturer's list.

- If the screen contains one to four more defects than the manufacturer's defect list, the hard disk should be able to function normally. (The number of defects may be slightly more on larger drives.) Lock out the bad tracks according to the procedure described in the "Media Analysis" section in this chapter. If there are many more defects on the screen than on the manufacturer's defect list, the drive could be defective.
- If the test halts itself, displays an error message on your screen, and all of the above troubleshooting steps have been followed, there is a problem with the controller, drive, or cabling.

MediaAnalysis

SpeedStor performs a comprehensive media analysis to check for media defects and to determine the ability of the drive to read and write data. When looking for data errors, this test writes to the disk and verifies several worst-case and random data patterns. Any error detected is reported and locked out on the bad track table.

Note: Running the media-analysis test will destroy any data on your hard disk. Before running this test, back up your hard disk's data. After the media analysis is complete, the partition(s) on the hard disk must be reformatted using the Partition Manager before any data is restored to the drive.

Select MediaAnalysis from the Diagnostics menu. A message will appear indicating that the drive is assumed to be initialized and data on that drive will be destroyed.

You can select all the cylinders or your own range of cylinders for the test.

Select DefaultCyls to test every cylinder, or ManualCyls if you want to limit the test to a smaller range of cylinders. Enter the number of the first cylinder to be tested, or press <Enter> to start cylinder 0. Then enter the number of the last cylinder you want tested, or press <Enter> to test the last cylinder. Define the range of heads you want tested.

Select DefaultHeads to test every head, or select ManualHeads if you want to limit the test to a smaller range of heads. Enter the number of the first head to be tested, or press <Enter> to start at the first head. Then enter the number of the last head you want tested or press <Enter> to test the last head.

If you use the default set of test patterns, the test patterns will be 6DB6, B987, 39C3, C39C, 4E65, 9249, FFFF and 0000. You may choose to manually enter your favorite pattern (hexadecimal numbers can be entered if preceded with the \$ character). The default set of test patterns has eight patterns and makes eight passes through the disk. A manual test pattern makes only one pass through the disk.

Each test performs a media analysis over the entire range of cylinders and heads specified. The amount of time required for each test varies with the drive capacity. Higher-capacity drives will take more time for each test.

Error Messages

This section identifies some common disk drive error messages and their sources (SpeedStor, system, DOS, or controller).

System and DOS Error Messages

DOS or the system ROM BIOS, not SpeedStor, originates the following error messages.

17XX Disk Error

This message appears if a problem is found during start up and warm boot when your system performs diagnostics and checks whether the hard disk is installed.

Common problems causing a "17XX" error message are:

- The hard disk has not been initialized. Initialize the drive according to the procedure in Chapter 2.
- The drive interconnecting cables are improperly installed. Refer to the "Preliminary Troubleshooting" section in this chapter.

- The drive-select jumper is improperly installed. Check the connections and reinstall the jumpers, if necessary.
- The wrong drive type has been selected. On an AT, either the Setup program (on the AT Diagnostics disk) or SpeedStor's Manual Setup has been used improperly to specify a drive type.
- The battery for the CMOS RAM needs replacing. Replace your system's battery with a new one. Consult your system manual for information about replacing your battery.

Invalid Drive Specification

This error message appears when your system does not recognize the specified drive type. Common problems causing an "Invalid Drive Specification" error message are:

- You attempted to access the hard disk and the system does not recognize that a hard disk is present.
- You attempted to access the hard disk and the system does not recognize one or more DOS partitions on the hard disk. You may have made changes to the system configuration without rebooting afterward. You must reboot after changing your system configuration in order for the system to recognize the changes.
- The DOS partition is not present or is not active. Refer to Chapter 3 for information on using the Partition Manager. Be certain that one or more DOS partitions are present and that they are active or accessible.
- The SpeedStor device driver is not active. Be certain that the hard disk active partition, or a floppy diskette that you will use to boot your system, contains the device driver SSTOR.SYS in the directory, as well as the file CONFIG.SYS. The CONFIG.SYS file must contain the line "Device=SSTOR.SYS". Reboot the system to activate the device driver.

Disk Drive Controller Error Messages

Each of the messages listed below indicates a problem with either the hard disk or the hard disk controller.

Read Fault
Write Fault
Seek Error
CRC Error
Sector Not Found

Enter R to retry the operation if given the opportunity.

These error messages arise from common problems such as:

- A media defect needs to be locked out and the partition reformatted. Make sure to back up your data before running Media Analysis. Refer to "Media Analysis" (in this chapter) to find and lock out media defects on the hard disk.
- Incorrect drive type. Retype the drive using SpeedStor's Manual Setup menu.
- Drive not initialized or initialization data corrupted. Back up the contents of the hard disk to a floppy disk or tape. Reinitialize the drive according to the procedure in Chapter 2.

Drive not ready

- Initialization data on the drive has been corrupted. Back up the contents of the hard disk to a floppy disk or tape. Reinitialize the drive according to the procedure in Chapter 2.
- The hard disk and/or controller has failed. Refer to the "Preliminary Troubleshooting" section and individual diagnostic tests described in this chapter to locate the problem.

Bad Command to Disk BIOS

- This error is usually caused by an attempt to access a hard disk that is not active. Check the drive type(s) specified and reboot the system.

Chapter 5 Using ParkHeads

Use SpeedStor's ParkHeads option to keep the disk head from damaging the hard disk during transportation by moving the head to the designated landing zone. ParkHeads moves read/write heads to a specific cylinder number called the landing zone. Most hard drives automatically park their heads when the computer is turned off. However, if there is some doubt as to whether your drive parks its read/write heads, park the heads using this routine for safety.

There are two methods available for using the ParkHeads option. One is a command-line entry, and the other is from the SpeedStor Main Menu. This allows you to use ParkHeads from DOS or from within the SpeedStor program.

Method 1: If you are in DOS, you can park the heads on your drive by entering the following on the command line:

SSTOR PARK

Method 2: If you are in SpeedStor, select ParkHeads to protect your hard disk before moving your system.

Using either option gives you the same result. The heads will remain parked as long as the system is turned off. They are automatically unparked after the first access.

Chapter 6

Using Command- and Device-Line Options

SpeedStor software includes a number of command-line and device-line options available for advanced SpeedStor users. Most users won't need to use any of these options; however, they are available for special configurations.

Notes: Use SpeedStor command-line and device line options with great caution. If you invoke some of them incorrectly, you can damage or lose data.

Some command-line and device line options are system dependent; several will not work on Micro Channel™-style computers. Those that are system dependent are noted.

Command-Line Options

To invoke SpeedStor using any of the available command-line options, place the SpeedStor diskette in drive A. Then at the A> prompt, enter the following command:

SSTOR /option /option

Be sure to separate each option with a space and a slash. For example, to invoke the /MAXMEGS:XX and /NODMA options, you would enter both options on the command line:

SSTOR /MAXMEGS:XX /NODMA

/1003RA2

Forces the controller type to WD-1003RA2 (RLL). (Will not work on Micro Channel-style computers.)

/1005	SpeedStor detects Western Digital WD1005-WAH controllers automatically. Specify this option if you are using a controller compatible with a WD1005-WAH. (Will not work on Micro Channel-style computers.)
/1006	SpeedStor detects Western Digital WD1006 controllers automatically. Specify this option if you are using a controller compatible with a WD1006. (Will not work on Micro Channel-style computers.)
/1007	SpeedStor detects Western Digital WD1007 controllers automatically. Specify this option if you are using a controller compatible with a WD1007. (Will not work on Micro Channel-style computers.)
/232xA	SpeedStor detects an Adaptec 2322A or 2320A controller automatically. Specify this option if you are using controllers compatible with the 2322A or 2320A. (Will not work on Micro Channel-style computers.)
/4070	Use with the Future Domain TMC-830 SCSI host adapter and the Adaptec 4070 RLL to SCSI converter. (Will not work on Micro Channel-style computers.)
/12BITFAT	Use with versions of MS DOS 3.0 or higher that limit the File Allocation Table (FAT) to 12-bit entries. This option forces the Partition Manager to use a file structure using 12-bit FAT entries.

/AT1	ROM is compatible with IBM's original AT ROM. Forces AT compatibility. (Will not work on Micro Channel-style computers.)
/AT2	ROM is compatible with IBM's second AT ROM. Forces AT compatibility. (Will not work on Micro Channel-style computers.)
/AT8	ROM is compatible with IBM's 8 Mhz AT ROM. Forces AT compatibility. (Will not work on Micro Channel-style computers.)
/AUTOSTEP(:xx)	Tells SSTOR.SYS to use a faster step rate index if it thinks it would improve the performance. If :xx is given, it will be used for a step rate. This option differs from /STEPINDEX:xxx in that SpeedStor will check the value before changing it. This option is controller dependent.
/BOOTMEGS:xxx	Modifies the default size of the small bootable partition when using the AutoPart menu. The 'xxXX' is the new size of the small bootable partition and can be a maximum of 32 MB for DOS versions less than 3.31 and as large as /MAXMEGS:XXXX for DOS 3.31 and later.
/DMA	Forces all disk transfers to avoid the 64K DMA boundaries.

- /DOSONLY** Allows only DOS partitions to be created. Note that DOS partitions cannot override the drive type or overcome the 1024 cylinder barrier. Useful for ROM-supported drives, SCSI drives, or Translation Mode Controllers where the drive type is established by the controller.
- /DOSVER:xxx** Tells SpeedStor what version of DOS was booted. SpeedStor bases large partitioning on what version of DOS it is running under. Often it is important to distinguish between PC/MS DOS 3.3 and below and PC/MS DOS 3.31 and above. Also, some OEM DOS versions, such as those by Zenith and Wyse, have version numbers that begin with 3, but are similar to PC/MS DOS version 4.0. Note that you must not enter a period in the version number.
- /FLAWLESS** Use only on SCSI and IDE drives. Causes SpeedStor to bypass the verify pass when low level formatting and bypasses the scan for bad clusters when formatting under Partition Manager. Can be used to quickly test bootability when troubleshooting, as the DOS partitions format very quickly.
- /HELP** Displays the available command-line options before you start SpeedStor.
- /INTERLEAVE:xx** Defines the default interleave value. When using this option, the low-level initialization is done with an *xx:1* interleave value. When *xx* is set to 1, a skew factor of 2 is used.
- /MAX4PARTS** Ignores the space used by the fifth through

the eighth partition entries. Some controllers store information in these entries. Use this option if partitions entries are being garbled or destroyed. (This option is commonly used for some Western Digital XT-compatible controllers.)

- /MAXMEGS:xx** Prevents the Partition Manager from creating a partition any larger than *xx* MB. The default values (maximum limits) are as follows:
- | | |
|--------------------|---------|
| DOS 2.X | 128 MB |
| DOS 3.0 - 3.30 | 512 MB |
| DOS 3.31 and later | 2048 MB |
- /NOCMOS** Stores drive-type override information on the hard disk instead of in CMOS RAM. It also preserves the disk type that remains in CMOS. The drive type selected within the system Setup or Set Configuration program is retained. Setup is used to set up the date, time, and type of hard disk.
- Note:* The **/NOCMOS** option does not enable the drive type of the DOS boot partition to be overridden. Type override information is stored on the disk and not in CMOS; the option does not eliminate the need for a CMOS type.
- /NOCOLOR** Removes color support and displays in monochrome. With monochrome monitors using shades of gray to emulate color graphics, the color of SpeedStor's displays and menus might be indistinct.
- /NODISKBIOS** Instructs SpeedStor not to install the disk overlay BIOS.

/NODMA	Allows transfers to cross DMA segment boundaries (AT default).
/NOTYPE	Disables SpeedStor drive-type overriding and uses the drive parameters that the system supports.
/ROMLIST	Displays a list of the drive tables in system ROM.
/SECS:xx	Use with nonstandard controllers (ESDI, RLL) when the disk-drive type override must also override the number of sectors, while setting drive type. This option forces the number of sectors to the number specified as xx. Refer to Appendix B for more information.
/SKEW:xx	SKEW controls the rotation of the interleave table from track to track when a 1:1 interleave has been selected. For example, if Head 0 starts with Sector 1, then the next head, Head 1, would start with sector number 3, assuming a skew factor of 2. When Track 0 is sequentially read, a head switch occurs at the drive. This allows sequential reads to switch heads without having to do an extra revolution of the media.
/STEPINDEX:xx	Use to force the step index to the specified value. The step index controls how fast step impulses go to the drive; it is controller dependent.
/USECMOS	Forces SpeedStor to try CMOS as the primary place to store its drive override

type. If not possible, it will revert to the hard disk.

/XT	Use when the Type menu is unavailable and when using an XT 100% compatible controller; left for compatibility with earlier versions of SpeedStor. (Will not work on Micro Channel-style computers.)
/XT16	Use when using one of SMS's (OMTI) XT type controllers; left for compatibility with earlier versions of SpeedStor. (Will not work on Micro Channel-style computers.)

Device-Line Options

Device-line options are used with SSTOR.SYS, an installable device driver that allows DOS to use high capacity hard disk drives. The device driver must be activated from your CONFIG.SYS file when your system boots. With SSTOR.SYS you can:

- Support SpeedStor partitions transparently to the user
- Give DOS the power to manage high-capacity drives
- Activate as many as twenty-four partitions
- Support read-only partitions
- Override the ROM drive type tables
- Increase drive performance

SSTOR.SYS must be active to support SSTOR partitions.

SpeedStor's ADDevice is special SpeedStor utility that

- Looks for a CONFIG.SYS file on volume C:
- Creates or edits CONFIG.SYS so that it contains the "Device=SSTOR.SYS" statement
- Copies SSTOR.SYS onto drive C:

As an alternative to using the ADDevice program, you can create or modify the CONFIG.SYS file with an ASCII text editor such as WordStar or an ASCII line editor such as Edlin.

Either way, you should add the following line to your CONFIG.SYS file:

```
device=SSTOR.SYS (/option) (/option)
```

You can use SSTOR.SYS with a number of command-line options that improve its flexibility and performance in nonstandard configurations. Use the command-line options by running ADDevice, followed by the desired option(s). For example, to invoke ADDevice with the /AT command-line option, you would enter the following command:

ADDevice /AT

Note the following SSTOR.SYS characteristics:

- When the system starts, or boots, a message appears indicating the logical drive assignments, partition capacities for SSTOR partitions, and the amount of system memory used by SSTOR.SYS.
- SSTOR.SYS can reside with other device drivers in the CONFIG.SYS file. If other drivers are present, for example, VDisk.Sys, the assignment of logical drive letters may be altered. DOS assigns drive letters C: through Z: in the order that device drivers are entered for block devices in the CONFIG.SYS file, and according to the order of partitions on the partition table.

Some device drivers are sensitive to their position in the CONFIG.SYS file. If you encounter problems, reorder the device statements.

- All device drivers increase the amount of RAM space DOS occupies. SSTOR.SYS tells you at boot time how much RAM it is reserving for its own use (typically 4K to 8K—can be up to 20K for partitions with large logical sector sizes).

You can use ADDevice or a text or line editor to add the following device-line options to CONFIG.SYS file.

/1005	SpeedStor detects Western Digital WD1005-WAH controllers automatically. Specify this option if you are using a controller compatible with a WD1005-WAH. (Will not work on Micro Channel-style computers.)
/AT	Forces AT-style vectoring and defaults to /NODMA. (Will not work on Micro Channel-style computers.)
/AUTOSTEP:xx	Tells SSTOR.SYS to use a faster step rate index if it thinks it would improve the performance. If :xx is given, it will be used for a step rate. This option differs from /STEPINDEX:xxx in that SpeedStor will check the value before changing it. This option is controller dependent.
/AUTOTYPE	Disables SpeedStor drive-type overriding
or /NOTYPE	and uses the drive parameters that the system supports.
/DMA	Forces all disk transfers to avoid the 64K DMA boundary.

/FIXED	Causes SpeedStor to assume removable drives are really fixed drives.
/MAX4PARTS	Ignores the space used by the fifth through the eighth partition entries. Some IBM XT controllers store information in these entries. Use this option if partition entries are being garbled or destroyed.
/NODIRECT	Uses the INT 13h calls for disk access instead of going through the direct SCSI connection, increasing speed and error handling.
/NODISKBIOS	Instructs SpeedStor not to install the disk BIOS overlay.
/NODISPLAY	Disables driver output during system boot.
/NODMA	Allows transfer across DMA segment boundaries (AT default).
/NOFCB	Inhibits installation of the FCB-conversion module.
/NOXCYL	Breaks up multi-sector requests across cylinder bounds.
/NOXHEAD	Breaks up multi-sector requests across head bounds.
/NOTPCDOS	Allows non-IBM identifiers in the boot block.
/OMTI16	Forces XT16-style type override and defaults to /DMA. (Will not work on Micro

Channel-style computers.)

/READBACK	When VERIFY=ON, the driver will read back the data written to the drive and will compare it to the original data. This is the most reliable method, but it is very slow. The SDC-800 host adaptor has special support for this, so it is only slightly slower than normal.
/RM:x	Sets the minimum number of partitions per removable media drive.
/VIRTUAL	Allocates a 32K buffer space for device drive I/O to correct virtual to physical memory addressing problems for bus master controllers. For use with 386 memory managers with the Bus Master controller.
/XT	Forces XT-style type override and defaults to /DMA. (Will not work on Micro Channel-style computers.)
/XT16	Forces XT16-style type override and defaults to /DMA. (Will not work on Micro Channel-style computers.)

Booting DOS from the Hard Disk

Starting, or booting the system from the hard disk, occurs when DOS is loaded after power is applied, or when the system is rebooted with <Ctrl + Alt + Del>. To start the system with SpeedStor installed, the following conditions must be met:

- There must be a valid, formatted, boot (active) DOS partition on drive 1.

- The DOS boot (active) partition on drive 1 must have the ACTIVE status.
- A copy of the DOS system files must be present on the DOS bootable partition on drive 1. This is done using the INSTALL SYS:X command or using the Automatic INSTALL procedure described on the Quick Installation Card.
- The file COMMAND.COM must be copied to drive C:. (This is done automatically by INSTALL SYS:X.)
- The root directory of the bootable partition must contain the CONFIG.SYS. The CONFIG.SYS file must contain the Device=SSTOR.SYS statement. (This is done automatically by INSTALL SYS:X.)
- A copy of the file SSTOR.SYS must be present in the boot partition, either in the root directory or subdirectory addressed by the device statement. (This is done automatically by INSTALL SYS:.)
- In a system with two hard disks, DOS will only boot from the first disk.

Booting the System from a Diskette

The rules described in the above sections for starting the system from a hard disk also apply to a diskette. To create a SpeedStor bootable diskette, first format a diskette with the /S option, then copy the files CONFIG.SYS and SSTOR.SYS from the hard disk to the newly-formatted DOS diskette. This diskette can now have applications or other files placed on it and be used to start the system if desired.

The root directory of the SpeedStor bootable diskette must contain the CONFIG.SYS and SSTOR.SYS files. The CONFIG.SYS file must contain the Device=SSTOR.SYS statement.

Appendix A SpeedStor Files

This appendix provides a list of SpeedStor files and a brief description of their functions.

ADDEVICE.BAT	Adds DEVICE=SSTOR.SYS to CONFIG.SYS or changes the DEVICE=HARDDRIVE.SYS line in CONFIG.SYS to DEVICE = SSTOR.SYS. Copies SSTOR.SYS to the root directory of C:.
INSTALL.BAT	Contains an automated install script.
MKCONFIG.EXE	A program used by addevice.bat.
README	If present, README contains information regarding technical changes made to SpeedStor software since this manual was printed.
SSCOLORS.MAC	Contains an alternate color set. Rename this file to SSCONFIG.MAC to activate.
SSTOR.EXE	The SpeedStor program.
SSTOR.INI	The initialization file for SSTOR.EXE (cannot be customized).
SSTOR.MAC	A macro file used by INSTALL.BAT.
SSTOR.SYS	The SpeedStor device driver.
SSVOL.EXE	The SpeedStor run-time volume manager/utility.

Appendix B Controllers

SpeedStor supports virtually all AT-compatible hard disk drive interface types—ESDI, RLL, SCSI, MFM (ST506). SpeedStor does not universally support all controller manufacturers and models. This appendix will discuss the various controllers SpeedStor does and does not work with. In addition, there are discussions of various jumper settings and command-line options used with some special controller models.

This appendix covers the controllers SpeedStor has been customized to work with automatically and discusses how SpeedStor may be used with other controller models.

ST506 (MFM) Controllers

The ST506 disk controller interface was the first widely used by the IBM PC. It is the standard controller type supplied by personal computer OEMs. The following are some of the rules and exceptions.

Standard Controllers

- DTC 5280, 5180
- Everex EV-332
- Western Digital WD1003-WAH, WD1003-WA2, WD1003V-MM1, WD1003V-MM2

1:1 Interleave Controllers

With any 1:1 interleave-capable MFM controller, use the automatic installation instructions described on the SpeedStor Quick Reference card.

The /1006 option defaults the interleave factor to 1:1 and the controller type to ST506. Use on the following controllers:

- DTC 7280
- OMTI 8240, 8140
- Western Digital WD1006V-MM2, WD1006V-MM1

ESDI Controllers

The following covers ESDI controllers from Adaptec, Western Digital, and OMTI. Also covered is how to use unspecified controllers with SpeedStor.

Adaptec ACB2322A and ACB2322B

SpeedStor automatically detects and distinguishes these types of ESDI controllers. It can perform low level formatting as well as partitioning.

Two areas of concern are default jumper settings for the controller and the command-line option **/232xA**. You *must* add or move a jumper on the controller to disable controller BIOS prior to running SpeedStor, and you must include the command-line option if using a 2322A or 2320A controller.

The following hardware settings are necessary:

- ACB2322B: Move jumper on JP7 from pins 1-2 to between pin 2 of JP7 and TP14 (TP14 is underneath pin 2 of JP7)
- ACB2322A: Remove jumper from JP11.
- ACB2320A and ACB2320B: Remove jumper from J13.

*** CAUTION ***

On ACER or DTK computers, or any clone computer that uses the DTK BIOS, the wait state jumper must be jumpered to avoid problems. For Adaptec 2322A or 2322A-8 controllers, J12, position 3, must be jumpered. For Adaptec 2322B or 2322B-8, J2, position 3, must be jumpered.

Western Digital WD1007A-WA2/WAH

Many computer OEMs carry this model of controller in high-end AT-compatible systems. This controller has a feature which allows it to override the system drive type at boot time. It also supports a sector translation mode. Two types of installation are possible with this controller: SpeedStor and controller BIOS formatting. This section discusses how to use SpeedStor under an MS-DOS installation.

The following hardware settings are necessary:

- Add jumpers to the following positions on your controller: **W14** and **W8**.
- Remove the jumper located at W3 to disable the BIOS.
- W14 disables sector translation mode. SpeedStor partitioning will not work correctly with the translation mode enabled.

- W8 enables WD1005 mode. It changes the controller from supporting 35 sector-per-track formatting with one spare sector on each track to supporting 36 sector-per-track formatting without sector sparing. Disk space utilization is increased somewhat. Without W8 jumpered, SpeedStor will not be able to format a drive with 36 physical sectors per track; the maximum is 35.

SpeedStor formatting will proceed as described in the manual without the use of any special command-line options or switches. SpeedStor will automatically detect the WD1007A controller.

Note: To avoid boot problems when using the WD1007A controller, sector translation should be disabled. You should jumper W14.

OMTI 8620/8627

SpeedStor is customized to support OMTI automatic drive type determination. The OMTI controller interrogates the drive using a serial ESDI command. Make sure you specify "No Drives Installed" in the CMOS setup prior to running the SpeedStor installation.

Other ESDI Controllers

Other ESDI controllers are not specifically supported by SpeedStor low-level formatting and drive type override selection. Follow the manufacturers' instructions for performing low-level format with built-in BIOS programs or programs supplied on diskette. After performing low-level initialization following the manufacturer's instructions, proceed with partitioning SpeedStor. Skip the low-level initialization phase by answering NO to the "low-level?" prompt.

Translation Mode

Several popular ESDI controllers support a physical to logical sector translation mode. What this means in human terms is that the controller really knows how many heads, sectors per track, and cylinders the drive has but it tells everyone outside the controller otherwise. For instance, a drive installed with the following parameters

1224 cylinders, 15 heads, 35 sectors per track

may be altered mathematically by the controller to appear with the following parameters:

618 cylinders, 16 heads, 63 sectors per track

Calculated drive capacity between the translation mode drive and the physical drive parameters is nearly identical. The translation mode does not cause disk space to be compromised in any way.

Translation Mode Notes

Why is translation mode used?

1. Translation mode reduces the visible cylinder count on large drives to a number less than 1024. DOS and most other operating systems cannot exceed this barrier alone. The computer BIOS as well, in most cases, cannot address more than 1024 cylinders.
2. When the translation mode is used, the system drive type supported by the ROM drive parameters is overridden by the controller. The computer is thus given the ability to use drives not supported by ROM.

How does SpeedStor interact with the translation mode?

The SpeedStor device driver, SSTOR.SYS, allows DOS to function with drives over 1024 cylinders (up to 4096) without the use of special translation modes. SpeedStor's disk BIOS overlay feature also bridges the 1024 cylinder limit inherent in most computer BIOS. A normal SpeedStor installation on a disk capable of using translation would first have to disable translation through hardware settings. Consult your controller manufacturer if you have questions about your ESDI controller.

When should I use the translation mode instead of SpeedStor?

SpeedStor provides full support for drive type override under DOS only. Use sector translation mode if the operating system being used is not MS or PC-DOS. If the disk drive is to be divided into DOS and other operating system partitions, use translation and DOS-owned partition types. Do **not** use SSTOR-supported partitions with sector translation modes.

RLL Controllers

In general, use the /SECS:26 command-line option. Most RLL controllers format drives to 26 sectors per track. The /SECS:26 option causes the selections of drive models in the SpeedStor program all to depict 26 sectors per track in the sectors column. SpeedStor contains other controller-specific command line options; the use of these is detailed under each controller definition.

SCSI Controllers

The IBM AT was designed with about 262KB of usable ROM extension address space. Video ROM BIOS is a typical usage of the ROM extension area. As an extension device, the SCSI

board is not tied to or limited by the conventions used with standard devices.

For example, the SCSI host adapter is more intelligent and can communicate higher-level commands between host adapter and drive. A commonly used command allows the host adapter to automatically retrieve disk drive parameters (heads, cylinders, sectors per track). SpeedStor takes full advantage of the intelligence of the SCSI interface. SCSI disk drives and subsystems experience by far the fewest compatibility problems and the easiest installations.

For SpeedStor installations, ensure that the ROM BIOS drive type is set to "No Drive Installed" with your SETUP program (unless there is a standard drive supported in the system along with the SCSI).

Other SCSI Host Adapters

Other host adapters are generally packaged with OEM-written formatting programs. SpeedStor can be used to partition drives on most of these adapters. Use the /NOTYPE command line option to recognize standard SCSI devices after the manufacturer's program has been used to low-level format drive(s).

XT Compatible Controllers

If you have an XT-style computer, and you are using a standard type controller with jumper-selectable drive types, install a jumper to select a drive type with the same number (preferably) or fewer read/write heads as the actual drive being installed. Do **not** install a jumper to select a drive type with **more** read/write heads than the actual drive being installed.

When using an XT Auto-Configure controller, initialize the drive using the initialization program supplied with the controller. Refer to the controller's installation guide. After initialization, return to SpeedStor and proceed with the installation. Use the command-line option /NoType to skip the low-level initialization stage, if an XT auto-configure controller has been used to initialize your drive.

If SpeedStor will not display Type when using a standard XT type controller with jumper-selectable drive types, you must install a hard drive that is specified by the controller drive type table.

To use the BIOS formatter program, use the DOS DEBUG program supplied on one of the supplemental DOS diskettes. Under DEBUG, type in the "G=" command followed by the starting address of the formatter program; on the Western Digital and many other controllers use C800:5. After the debug startup command enter

G=C800:5

Follow your controller manufacturer's instructions for specifics about using the BIOS formatter program. The following subsections list XT controller considerations to be aware of.

Autoconfigure BIOS

Autoconfigure BIOS means that the controller can initialize drives of varying head and cylinder parameters up to some specified limitations. Non-autoconfigure BIOS supports a limited set of drive models which are generally chosen by setting jumpers on the controller. The autoconfigure BIOS formatter program will generally prompt the user about dynamic configuration.

Answer Y if you wish to type in your own set of drive parameters. Answer N if the controller is preset to the drive type you are installing. The drive type is stored on the disk by the formatter program where the BIOS can retrieve it each time the system boots.

Autoconfigure BIOS will also prompt the user about virtual configuration.

Answer N. Virtual configuring means that the controller will subdivide one physical drive so that it appears to the operating system to be two drives. This is not necessary to do if SpeedStor is going to be used to partition the drive.

Non-Autoconfigure BIOS

The non-autoconfigure BIOS formatter program generally prompts the user only to enter the interleave factor. It should be noted here that SpeedStor software cannot override drive type support of a non-autoconfigure BIOS, nor will it be able to low-level format a drive other than the supported drive on this type of controller. Only those drive models which the controller specifically supports may be used.

Appendix C

Special Configurations

This appendix contains information that will be useful if you have a nonstandard hardware or software configuration. If you are adding a SCSI drive to a system that has RLL, MFM, or ESDI drives installed, this appendix contains important information about establishing drive types on mixed systems where SCSI and non-SCSI drives reside. In this appendix you'll find helpful information if you're planning to use multiple operating systems on the same drive; you'll also find information to help you avoid possible compatibility problems when using Windows 3.0 with SpeedStor.

If you are adding a SCSI drive to a system that has only SCSI drives installed, you will not be prompted during the installation to select drive types. If you are adding a SCSI drive to a system that has an RLL, MFM, or ESDI drive installed, however, SpeedStor will ask you to enter information about drive types during the installation. You will need to follow the procedure described in the next section for establishing drive types on mixed systems before installing your SCSI drive.

Establishing Drive Types

Whenever you combine SCSI and non-SCSI drives in a system, you should use your computer's Setup or Set Configuration utility to establish drive types for non-SCSI drives **before** installing the SCSI host adapter. SpeedStor will not recognize a drive if it has no drive type set.

Note: If you use SpeedStor to change a drive's type to a non-standard type (one not listed in your computer's drive type table), from then on you must run SpeedStor again each time you use Setup or Set Configuration to

change that drive's type. If you experience problems after changing drive types with SpeedStor, contact Storage Dimensions SpeedStor Technical Support.

It is necessary to set non-SCSI drive types before installing SCSI drives because drives are numbered sequentially at boot time; non-SCSI drives are recognized and numbered before SCSI drives, but only if they have been properly typed.

At boot time, if a non-SCSI drive's type has not been established, the system will not recognize it at all; it will be ignored, and its number will be assigned to a SCSI drive. Similarly, if the system reboots and looks for a non-SCSI drive where there is none—for example, if you removed the drive and did not run SpeedStor or Setup or Set Configuration afterward, you will get a hard disk error message when your system runs power-up diagnostics and tries to test a nonexistent drive.

To properly establish drive types on mixed systems when changing your hardware configuration, follow these steps:

1. **Physically install or remove non-SCSI drives.**
2. **Remove all SCSI host adapters from the system.**
When you remove the adapters, you don't have to remove cables.
3. **Type all non-SCSI drives.**
Use INSTALL or SSTOR to correctly specify drive types for all non-SCSI drives. It is especially important to set any unused drive number to "<no drive>" if no drive is installed in that position (if you removed a non-SCSI drive).
4. **Physically install all SCSI drives. Reinsert SCSI host adapters.**

5. Use SSTOR to prepare your newly connected drive .

Using Multiple Operating Systems

SpeedStor partitions can reside with multiple operating systems. Here are a few guidelines:

- Be aware that SpeedStor overrides the host system's ROM BIOS table of disk drive types only for DOS. Other operating systems may recognize only those disk drive characteristics represented by the ROM BIOS drive-type table.
- Always use SpeedStor's Partition Manager to change the boot (active) partition.
- If you frequently switch between operating systems, it is often easier to boot from a system diskette than to change the active partition each time you want to change operating systems.

Using Windows 3.0

In rare instances, SpeedStor users could experience compatibility problems when using Microsoft's SMARTDrive disk caching utility. Your data could be corrupted if all the statements in either of the following two scenarios are true:

1. Your data *is* at risk if all the following statements are true:
 - Your hard disk contains more than 1024 cylinders
 - Your computer is not an IBM PS/2 or true compatible
 - You are using Microsoft SMARTDrive
2. Your data *may* be at risk if all the following statements are true:
 - Your system's ROM BIOS does not support your hard disk drive type

- Your system has been customized with parts not supported by the computer's manufacturer
- You are using Microsoft SMARTDrive
- You are using DOS version 3.30 or higher

Determining Risk

If you are using SpeedStor and Windows 3.0, your CONFIG.SYS file probably contains a device statement similar to this one:

```
device=smartdrv.sys
```

If you find this statement or one similar to it, your data is at risk.

Eliminating Risk

Microsoft is aware of the problem and is revising its software to recognize SpeedStor's device driver. Microsoft has announced plans to issue free upgrades when it resolves the problem. To eliminate risk of data corruption until upgrades become available, you should modify SMARTDrive. You should do this **before** any reboot after installing SSTOR and Windows 3.0 on the same drive.

Note: This step involves changing your CONFIG.SYS file; be sure to make a backup copy of your CONFIG.SYS file before you begin. Consult your DOS manual for instructions on copying and renaming files if you don't already know how to do this.

To modify SMARTDrive, follow these steps:

1. **Using a text editor or word processor, open the CONFIG.SYS file, located on the root directory of your system's boot partition.**
2. **Look for the following line.**

```
device=smartdrv.sys
```

The statement may look slightly different; it could be preceded by a path name or modified by device-line options, as follows:

```
device=c:\smartdrv.sys /option /option
```

3. **Modify the line, adding /p.** This option will allow SSTOR to add partitions. Microsoft is still working on this problem, so you will receive an error message, but SpeedStor will work properly.
4. **Save your modified CONFIG.SYS file.**
5. **Reboot your system.**

Either turn the power off and on again or press <Ctrl + Alt + Del> to restart your system.

Glossary

ADDevice: a utility that looks for a CONFIG.SYS file on the C: volume, creates CONFIG.SYS if it is not present, edits CONFIG.SYS so that it has the "Device=SSTOR.SYS" statement, and copies SSTOR.SYS onto the hard disk drive.

block: a group of bytes handled, stored, and accessed as a logical data unit, such as an individual file record.

cluster: the smallest allocatable unit of disk storage allowed by MS-DOS; each FAT entry represents one cluster.

CMOS RAM: an area of RAM memory, backed up by battery, where system configuration information is stored. It contains an index to point to the ROM table for a particular drive and is only used for AT compatibles with Western Digital WD1003 compatible controllers.

controller: a miniature CPU dedicated to controlling a peripheral device, such as a disk drive, tape drive, CRT, or printer. The controller executes commands from the central processor unit and reissues commands to the peripheral device.

cylinder: a set of disk tracks that are simultaneously under the set of read/write heads. This three-dimensional storage volume can be accessed after a single seek.

directory: a listing of files maintained by the disk operation system (DOS) or a database management system to enable a user to quickly access data files.

drive-type override: to integrate hard disks that are not on the AT's drive-type table and accomplished using SpeedStor's internal-drive tables or Manual Params option.

ESDI: Enhanced Small Device Interface

File Allocation Table: (FAT). Allocates space on the disk for files, one cluster at a time; locks out unusable clusters; identifies unused (free) area; and lists a file's location. With two FATs present, the second copy ensures consistency and protects against loss of data if one of the sectors on the first FAT is damaged.

format: in a disk drive, the arrangement of data on a storage media. A standard 5 1/4-inch disk format consists of 17, 26, or 36 sectors per track, and 512 bytes of data per sector, plus identification, error correction, and other bytes necessary for accessing and synchronizing data.

formatted capacity: actual capacity available to store data. The formatted capacity is the gross capacity, less the capacity taken up by the overhead data used in formatting the disks.

head: the electromagnetic device that writes (records), reads (plays back), and erases data on magnetic media

head landing zone: the non-data area on the disk set aside for the controlled takeoff and landing of the heads when the drive is turned on and off.

INT 13h: a disk drive software interface that system programmers use to access the hard disk drive.

interleave: an ordering of physical sectors to be skipped between logical sectors on your hard disk.

kilobyte: (KB). Approximately 1000 bytes. (However, because computer memory is partitioned into sizes that are a power of two, a kilobyte is really 1024 bytes.)

landing zone or Lzone: the cylinder number where ParkHeads moves the read/write heads.

logical sector: the lowest unit of space that DOS can access through a device driver; one or more physical sectors; for example, a logical sector contains:

Physical Sectors	Bytes	Megabytes
1	512	0 - 32
2	1024	33 - 64
4	2048	65 - 128
8	4096	129 - 256

megabyte: (MB). approximately one million bytes (actually 1,048,576 bytes).

modified frequency modulation: (MFM) . a method of encoding digital data signals for recording on magnetic media.

partition: a logical section of a disk drive, each of which becomes a logical device with a drive letter.

physical sector: the smallest grouping of data on the hard disk; always 512 bytes.

read/write head: the recording element which writes data to the magnetic media and reads recorded data from the media.

ROM table: the physical description of a drive table that the BIOS supports; a table of drive types located in system ROM BIOS providing characteristics of hard drives which is used in conjunction with CMOS RAM.

run-length-limited: an encoding process that repositions data bits and limits the length of string of zero bits in order to compress information being stored on disks.

SCSI: Small Computer System Interface.

sector: the smallest addressable unit of storage on a disk. Tracks are made of sectors.

sequential access: writing or reading data in a sequential order, such as reading data blocks stored one after the other on magnetic tape (the opposite of random access).

track: one surface of a cylinder.

unformatted capacity: storage capacity of disk drive prior to formatting; also called the gross capacity. (See format.)

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The following controllers need special consideration. Use the switches documented here to get full SpeedStor compatibility (ie, INSTALL /NOTYPE). If your controller does not appear on this list, it is most likely compatible with SpeedStor.

CONTROLLER	SWITCHES	COMMENTS
Adaptec 232xA	/232xA	
Adaptec 232xD	/NOTYPE	In translation mode, Use ROM to low level
Adaptec 1522		use ROM to low level format
Corel In 2000		Not compatible
DTC ESDI (6280)	/NOTYPE	In translation mode, Use ROM to low-level
		In non-translation mode, use BoundedInit less two cylinders of the drive
Fastor/Lark	/NOTYPE	Use ROM on controller to low-level
		Use INSTALL SYS:1 to copy hidden files
Ultrastor 12F/12C	/NOTYPE	Use ROM on controller to low-level
WD1003RA2 (RLL)	/1003RA2	
WD1005	/1005	
WD1006	/1006	
WD1007	/1007	With BIOS disabled
WD7000 FASST		Do not low-level format drive

IDE drives: SpeedStor is compatible with the IDE interface. If, however, you experience problems formatting or booting from your IDE drive, check to see if CMOS is set to a drive type which closely matches. BUT DOES NOT EXCEED the capacity of your drive. If you find a closer match in your CMOS table, choose the type and re-install with SpeedStor using the /NOCMOS option.



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